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ANALYSIS SUPPORT PLAN FOR HEAVY FORCE MODERNIZATION (HFM) TRADEOFF ANALYSIS (TOA) SUPPORT

FORT LEAVENWORTH

U.S. ARMY
TRADOC ANALYSIS COMMAND - FORT LEAVENWORTH
TRAC - FLVN
FORCE ANALYSIS DIRECTORATE
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April 1989

TRADOC Analysis Command-Fort Leavenworth (TRAC-FLVN)
Force Analysis Directorate
Fort Leavenworth, Kansas 66027-5220

ANALYSIS SUPPORT PLAN
FOR
HEAVY FORCE MODERNIZATION (HFM) TRADEOFF ANALYSIS (TOA) SUPPORT

by

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ACN 73324

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The TRADOC Analysis Command-Fort Leavenworth provided support to the Heavy Force Modernization Task Force's tradeoff analysis in the form of the Enhanced Lanchester Plus (ELAN+) and Combined Arms Model-Antiarmor Munitions (CARMO-AM) simulation runs. The plan outlines all of the steps necessary in this effort. The plan also states the support, resource, and administrative requirements.

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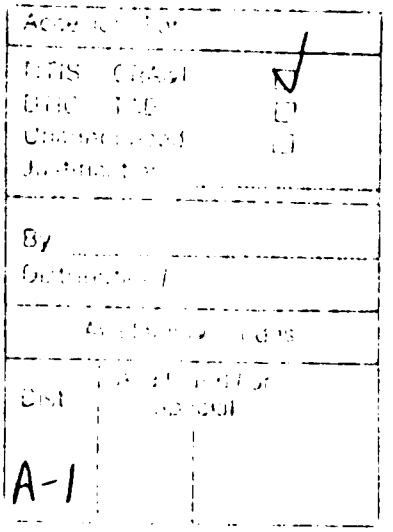

ANALYSIS SUPPORT PLAN
FOR
HEAVY FORCE MODERNIZATION TRADEOFF ANALYSIS

1. Purpose. The purpose of this analysis support plan is to outline the analytical support to the Heavy Force Modernization Task Force (HFM-TF) Tradeoff Analysis (TOA).

2. Scope.

a. Limitations.

(1) The analysis will address only the following armored vehicle alternatives which were provided by the HFM-TF: turret versus turretless tank, heavy versus medium future infantry fighting vehicle (FIFV) chassis, and either advanced antiarmor weapon system-heavy (AAWS-H), advanced antiarmor weapon system-medium (AAWS-M), or no missile on FIFV.

(2) Scenarios. The scenarios are limited to the European (EUR) theater. Three scenarios will be used: High-Resolution Scenario (HRS) 15, mechanized task force (TF) in defense; HRS 13, armored TF in attack; and HRS 12, heavy brigade in attack. These scenarios are vignettes taken from the standard scenario EUR 6.0.

(3) Models. Two models will be used: Enhanced Lanchester Plus (ELAN+) and Combined Arms Model-Antiarmor Munitions (CARMO-AM). ELAN+ will use HRS 15 and HRS 12; CARMO-AM will use HRS 15 and HRS 13.

(4) Doctrine. The analysis will be conducted only within the context of AirLand Battle-Future (Heavy) [ALB-F(H)] concepts. All tactics, techniques, and procedures will be consistent with ALB-F(H) concepts within the capabilities of the models.

b. Assumptions.

(1) System definition will be available in sufficient detail for modeling purposes.

(2) Red doctrine, equipment, and force structure projections out to 2004 are accurate.

(3) Adequate surrogate data will be available to substitute for identified data deficiencies.

3. Environment and threat considerations.

a. Environment.

(1) The battle does not include nuclear, biological, or chemical warfare.

(2) The battle is fought on a day with seven kilometer meteorological visibility in open terrain with an average line of sight of 2,300 meters.

b. Threat.

(1) In HRS 15, the mechanized TF is defending against two tank regiments.

(2) In HRS 13, the armor TF is attacking two lead battalions of a second-echelon tank regiment.

(3) In HRS 12, the heavy brigade is attacking two battalions of a second-echelon tank regiment.

4. Methodology.

a. Essential elements of analysis (EEA).

(1) Does the turreted or the turretless tank make the greater contribution to combat for the Blue force?

(2) Does the heavy or the medium chassis on the FIFV make the greater contribution to combat for the Blue force?

(3) Does the AAWS-H, the AAWS-M, or no missile on the FIFV make the greater contribution to combat for the Blue force?

(4) What combination of the preceding alternatives provides the greatest lethality against the Red force?

(5) What combination of the preceding alternatives provides the greatest survivability for the Blue force?

b. Measures of effectiveness (MOE).

(1) To assess overall performance in the battle, the MOE is the loss exchange ratio (LER). The LER is the ratio of the number of Red systems lost to the number of Blue systems lost [R(L)/B(L)].

(2) To assess issues of lethality, the MOE is the number of Red systems lost [R(L)].

(3) To assess issues of survivability, the MOE is the number of Blue systems lost [B(L)].

c. Alternatives.

(1) The alternatives to be examined are those in paragraphs 4a(1)-(3), above.

(2) The runs matrix that describes the combinations of alternatives to be run is shown in appendix A.

d. Method of analysis.

(1) The output of the 12 runs for each model for each of its two scenarios and for each MOE will be presented graphically with histograms.

(2) The output of the 12 runs for each model for each of its two scenarios and for each MOE will be analyzed with a 2x2x3 factorial analysis of variance (ANOVA) to determine the statistical significance of the differences among the alternatives.

(3) A total of 12 ANOVA will be accomplished. If inconsistent results become evident, additional study will be done to resolve the inconsistencies.

5. Criterion of choice. The preferred alternative will be made evident by using as the criterion of choice the level of statistical significance associated with the MOE as a function of the specific alternative.

6. Resource support requirement. No resources beyond those currently resident in Force Analysis Directorate (FAD), TRADOC Analysis Command-Fort Leavenworth (TRAC-FLVN) are required. FAD, TRAC-FLVN, will:

a. Write the plan.

b. Run the models and perform all analyses.

c. Write the final report.

APPENDIX A

RUNS MATRIX

TANK	FIFV		Run No.
	CHASSIS	MISSILE	
TURRET	HEAVY	AAWS-H	1
		AAWS-M	2
		NONE	3
	MEDIUM	AAWS-H	4
		AAWS-M	5
		NONE	6
NO TURRET	HEAVY	AAWS-H	7
		AAWS-M	8
		NONE	9
	MEDIUM	AAWS-H	10
		AAWS-M	11
		NONE	12

APPENDIX B

REFERENCES

1. CACI, Inc. Federal Resource and Systems Analysis Division. CARMO-AM Users Manual. Arlington, Virginia. January 1988.

2. TRADOC Pamphlet 11-8. Studies and Analysis Handbook. 19 July 1985.

3. DF, TRADOC Analysis Command-Fort Leavenworth, ATRC-FOQ, 27 June 1989, subject: Revised Study Plan and Analysis Plan Preparation Guide.

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5. TRADOC message, ATRC-RPR, 221500Z December 1988, subject: Armored Family of Vehicles (AFV) Trade-Off Analysis.

APPENDIX C

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